Dylan Robert Harp

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Education

Doctor of Philosophy — May 2009
Civil Engineering — with Distinction
University of New Mexico
Dissertation: Hydrogeological Engineering Approaches to Investigate and Characterize Heterogeneous Aquifers

Master of Science — December 2005
Civil Engineering — with Distinction
University of New Mexico
Thesis: Measurement and Estimation of Soil-Water Evaporation from Bare Soil

Bachelor of Science — May 2004
Civil Engineering - Minor in Spanish — Summa Cum Laude
University of New Mexico

Associate in Applied Science — May 1994
Forestry Technology
Southeastern Illinois College

Professional Experience

Staff Scientist, Los Alamos National Laboratory	2012 – present
Postdoctoral Research Assistant, Los Alamos National Laboratory	2010 – 2012
Graduate Research Assistant, Los Alamos National Laboratory	2005 – 2009
Graduate Research Assistant, University of New Mexico	2004 – 2005

Honors, Awards, Fellowships

New Mexico Small Business Program Top Ten Success Story Award with Letter of Appreciation from New Mexico Governor Susana Martinez	2014
Real Works Scholar Fellowship	2004 – 2006
American Chemical Society Award	2000

Research

Current LANL projects

Wellbore Integrity Technical Lead: National Risk Assessment Partnership Program	2014 – present
Subsurface Gas Migration Technical Lead: Defense Threat Reduction Agency Project	2015 – present
Brine Extraction Storage Test Modeling Lead, Rock Springs Uplift CO_2 Sequestration Project	2015 – present
Next Generation Ecosystems Experiment Arctic Project, Hydrothermal permafrost modeling	2014 – present
Underground Test Area Project, Radionuclide transport modeling	2013 – present

Previous LANL projects

Geothermal Tool Development Project Principal Investigator: New Mexico Small Business Assistance Program, \$50k/y	2014 – 2015
Uncertainty ToolKit Project Lead: Advanced Simulation Capability for Environmental Management Program, \$50k/y	2014 – 2015
Advanced Simulation Capability for Environmental Manangement Demonstration Project Lead: Nevada National Security Site Underground Test Area Program	2013 – 2014
Disposal of High Level Nuclear Waste in Salt Project	2012 – 2014
Nuclear Waste Disposal Integrated Tool Development Project	2012 – 2013
Greater Than Class C Borehole Disposal Project	2010 – 2011
Environmental Programs Grounwater Modeling of the Los Alamos Aquifer	2006 – 2011

Invited Talks

Department of Civil Engineering, University of Wyoming	2016
Department of Geosciences, Idaho State University	2011
University of New Mexico School of Engineering Convocation	2004

Honor Societies

Chi Epsilon Civil Engineering Honor Society, 2003 UNM Chapter President
Tau Beta Pi Engineering Honor Society
Phi Beta Kappa Honor Society

Professional Societies

American Geophysical Union

Professional Service

AGU Fall Meeting Student Poster Judge	2014 – 2015
Los Alamos Postdoctoral Research Day Judge	2013 – 2014

Postdocs and Students Mentored

Postdocs

Adam Atchley; Model analysis of hydrothermal permafrost models	2014 – 2016
Maruti Kumar Mudunuru; Reduced order modeling of geothermal models	2016

PhD Students

Ylva Sjöberg; University of Stockholm; Permafrost thaw modeling using ATS	2015
Amy Jordan; New Mexico Tech; Reduced order modeling of wellbore leakage	2013 – 2014

Post Masters

Soumi Manna; University of Wyoming; Parallelization of Walkabout code using OpenMP and MPI — 2015

Michelle Bourret; New Mexico Tech; Radioactive gas migration — 2016

Undergraduates

Reid Spence; Undergraduate; Georgia Tech; Radionuclide gas migration modeling — 2016

Daniella Martinez; Undergraduate; University of New Mexico; Multi-phase, multi-component geologic CO_2 sequestration modeling — 2015 – present

Shane McKinney; Undergraduate; New Mexico Tech; ASCEM Uncertainty Quantification Toolkit development — 2014 – present

Jaileen Del Valle Maldonado; Mickey Leland Energy Fellowship; University of Puerto Rico; CO_2 wellbore integrity — 2015

Mark Lange; Science Undergraduate Laboratory Interships Program; Texas Tech University; FEHM test suite development — 2015

Johnatan Jhon and Cristina Pappas; Miami; Barometric pressure influences on water level measurements — 2012

Brendalyn Harper; NNSA Intern; Alabama A&M; MADS GUI development — 2012

Brianeisha Eure, Norfolk State University Undergraduate; DREAM uncertainty quantification software development — 2011

Amanda Larson and Nicolas Young; Salt repository investigations — 2010

Daniel White and Kelly Krellner, UNM NSF Summer Students; Middle Rio Grande Endangered Species Act Collaborative Program — 2008

Computing skills

Programming: C/C++, Fortran
Parallel Computing: OpenMP and MPI
High Performance Computing: MOAB and SLURM
Scripting: csh, tcsh, bash and perl
Database: MySQL and MS access
Scientific: Python, Matlab, Octave, and R
Plotting: ParaView, VisIt, Gnuplot, Tecplot, and Surfer
Model Analysis: PEST, Dakota

Development: MATK (http://matk.lanl.gov), MADS (http://mads.lanl.gov)
ASCEM (http://esd1.lbl.gov/research/projects/ascem/)

Journal Articles

[1] Maruti Mudunuru, Satish Karra, Dylan R Harp, George Guthrie, and Hari Viswanathan. Interpolation-based reduced-order models to predict transient thermal output for enhanced geothermal systems. *Geothermics*, 2016. In Review.

[2] Elizabeth H Keating, Diana Bacon, Susan Carroll, Kayyum Mansoor, Liange Zheng, Yunwei Sun, and Dylan R Harp. Applicability of aquifer impact models to support decisions at CO_2 sequestration sites. *International Journal of Greenhouse Gas Control*, 2016. In Revision.

[3] Adam L Atchley, Ethan T Coon, Scott L Painter, Dylan R Harp, and Cathy Wilson. Influences and interactions of inundation, peat, and snow on active layer thickness. *Geophysical Research Letters*, 2016. In Review.

[4] Dylan R Harp, Rajesh Pawar, J William Carey, and Carl W Gable. Reduced order models of transient CO_2 and brine leakage along abandoned wellbores from geologic carbon sequestration reservoirs. *NRAP Special Edition: International Journal of Greenhouse Gas Control*, 45:150–162, 2016.

[5] Dylan R Harp, AL Atchley, SL Painter, ET Coon, CJ Wilson, VE Romanovsky, and JC Rowland. Effect of soil property uncertainties on permafrost thaw projections: a calibration-constrained analysis. *The Cryosphere*, 10(1):341–358, 2016.

[6] Elizabeth H Keating, Dylan R Harp, Zhenxue Dai, and Rajesh J Pawar. Reduced order models for assessing co 2 impacts in shallow unconfined aquifers. *International Journal of Greenhouse Gas Control*, 46:187–196, 2016.

[7] Ylva Sjöberg, Ethan Coon, Britta Sannel, Romain Pannetier, Dylan R Harp, Andrew Frampton, Scott L Painter, and Steve W Lyon. Thermal effects of groundwater flow through subarctic fens a case study based on field observations and numerical modeling. *Water Resources Research*, 2016. Accepted article.

[8] AL Atchley, SL Painter, Dylan R Harp, ET Coon, CJ Wilson, AK Liljedahl, and VE Romanovsky. Using field observations to inform thermal hydrology models of permafrost dynamics with ATS (v0. 83). *Geoscientific Model Development*, 8(4):27012722, 2015.

[9] Amy B Jordan, Philip H Stauffer, Dylan R Harp, J William Carey, and Rajesh J Pawar. A response surface model to predict CO_2 and brine leakage along cemented wellbores. *International Journal of Greenhouse Gas Control*, 33:27–39, 2015.

[10] Dylan R Harp, Philip H Stauffer, Phoolendra K Mishra, Daniel G Levitt, and Bruce A Robinson. Thermal modeling of high-level nuclear waste disposal in a salt repository. *Nuclear Technology*, 187(3):294–307, 2014.

[11] Dylan R Harp, Rajesh Pawar, and Carl W Gable. Numerical modeling of cemented wellbore leakage from storage reservoirs with secondary capture due to thief zones. *Energy Procedia*, 63:3532–3543, 2014.

[12] Dylan R Harp and Velimir V Vesselinov. Accounting for the influence of aquifer heterogeneity on spatial propagation of pumping drawdown. *Journal of Water Resource and Hydraulic Engineering*, 2(3), 2013.

[13] Dylan R Harp and Velimir V Vesselinov. Contaminant remediation decision analysis using information gap theory. *Stochastic Environmental Research and Risk Assessment*, 27(1):159–168, 2013.

[14] Dylan R Harp and Velimir V Vesselinov. An agent-based approach to global uncertainty and sensitivity analysis. *Computers & Geosciences*, 40:19–27, 2012.

[15] Dylan R Harp and Velimir V Vesselinov. Analysis of hydrogeological structure uncertainty by estimation of hydrogeological acceptance probability of geostatistical models. *Advances in Water Resources*, 36:64–74, 2012.

[16] Velimir V Vesselinov and Dylan R Harp. Adaptive hybrid optimization strategy for calibration and parameter estimation of physical process models. *Computers & Geosciences*, 49:10–20, 2012.

[17] Dylan R Harp and Velimir V Vesselinov. Identification of pumping influences in long-term water level fluctuations. *Ground water*, 49(3):403–414, 2011.

[18] Dylan R Harp and Velimir V Vesselinov. Stochastic inverse method for estimation of geostatistical representation of hydrogeologic stratigraphy using borehole logs and pressure observations. *Stochastic Environmental Research and Risk Assessment*, 24(7):1023–1042, 2010.

[19] Dylan R Harp, Mahmoud Reda Taha, and Timothy J Ross. Genetic-fuzzy approach for modeling complex systems with an example application in masonry bond strength prediction. *Journal of Computing in Civil Engineering*, 23(3):193–199, 2009.

[20] Dylan R Harp, Zhenxue Dai, Andrew V Wolfsberg, Jasper A Vrugt, Bruce A Robinson, and Velimir V Vesselinov. Aquifer structure identification using stochastic inversion. *Geophysical Research Letters*, 35(8), 2008.

[21] Dylan R Harp, MM Reda Taha, JC Stormont, E Farfan, and J Coonrod. An evaporation estimation model using optimized fuzzy learning from example algorithm with an application to the riparian zone of the middle rio grande in new mexico, usa. *Ecological Modelling*, 208(2):119–128, 2007.

Conferences

[1] Jeffrey Bielicki, David Blackwell, Dylan R Harp, Satish Karra, Richard Kelley, Shari Kelley, Richard Middleton, Mark Person, Glenn Sutula, and James Witcher. Estimating the prospectivity of geothermal resources using the concept of hydrogeologic windows. In *EGU General Assembly*, 2016.

[2] Jeffrey Bielicki, David Blackwell, Dylan R Harp, Satish Karra, Richard Kelley, Shari Kelley, Richard Middleton, Mark Person, Glenn Sutula, and James Witcher. Locating hydrogeologic windows. In *Stanford Geothermal Workshop*, 2016.

[3] Maruti Mudunuru, Sharad Kelkar, Satish Karra, Nataliia Makedonska, Jeffrey Hyman, Dylan R Harp, and Hari Viswanathan. Predictive modeling of subsurface flow, transport, and thermal drawdown of an egs reservoir based on a three dimensional discrete fracture network framework. In *Stanford Geothermal Workshop*, 2016.

[4] Dylan R Harp, Youzuo Lin, William Glassley, David E. Dempsey, Satish Karray, Mark Person, and Richard Middleton. A framework for robust analysis and visualization of geothermal prospectivity. In *Stanford Geothermal Workshop*, 2016.

[5] Zhiming Lu, Dylan R Harp, Kay Birdsell, and Konstantin Lipnikov. Verification of the ascem's next generation parallel flow and transport simulator. In *Modflow and More*, 2015.

[6] Mark Person, Shari Kelley, Richard Kelley, Satish Karra, Dylan R Harp, James Witcher, Jeffrey Bielicki, Glenn Sutula, Richard Middleton, and Jeff D. Pepin. Hydrogeologic windows: Detection of blind and traditional geothermal play fairways in southwestern New Mexico using conservative element concentrations and advective-diffusive solute transport. In *GRC Transactions*, volume 39, 2015.

[7] Ylva Sjöberg, Steve Lyon, Romain Pannetier, Ethan Coon, Dylan R Harp, Andrew Frampton, and Scott Painter. Thermal effects from groundwater flow-a case study from a subarctic fen within the sporadic permafrost zone of tavvavuoma, sweden. In *EGU General Assembly Conference Abstracts*, volume 17, page 14029, 2015.

[8] Dylan R Harp, AL Atchley, E Coon, SL Painter, CJ Wilson, VE Romanovsky, and A Liljedahl. Effects of soil property uncertainty on projected active layer thickness. In *AGU Fall Meeting Abstracts*, volume 1, page 0382, 2014.

[9] AL Atchley, Dylan R Harp, SL Painter, E Coon, CJ Wilson, VE Romanovsky, and A Liljedahl. Using observational data to inform physically based models of subsurface thermal hydrology properties and active layer thickness at the barrow environmental observatory, alaska. In *AGU Fall Meeting Abstracts*, volume 1, page 0381, 2014.

[10] SL Painter, E Coon, AL Atchley, Dylan R Harp, JD Moulton, E Shelef, C Xu, and CJ Wilson. Spatially resolved projections of carbon releases from thawing polygonal tundra. In *AGU Fall Meeting Abstracts*, volume 1, page 08, 2014.

[11] Dylan R Harp and R Pawar. Investigations in reducing the computational expense of transient 3d multi-phase co2 wellbore leakage simulations: Time-series matching versus multivariate adaptive regression splines. In *AGU Fall Meeting Abstracts*, volume 1, page 07, 2014.

[12] Dylan R Harp, Bill Carey, Amy Jordan, and Rajesh Pawar. Development of reduced order models of leakage in cemented wellbores at co2 storage sites. In *12th Annual CCUS Conference*, Pittsburgh, PA, 2013. NETL.

[13] Bill Carey, Kayla Lewis, Sharad Kelkar, Dylan R Harp, Shaoping Chu, and Rajesh Pawar. Geomechanical model of pore-pressure impacts on permeability of the wellbore. In *12th Annual CCUS Conference*, Pittsburgh, PA, 2013. NETL.

[14] Dylan R Harp and Scott L Painter. Leveraging existing process modeling capability in geosphere performance assessments. In *International High-Level Radioactive Waste Management Conference*, Albuquerque, NM, 2013. American Nuclear Society.

[15] Philip Stauffer, Dylan R Harp, and Bruce Robinson. Modeling of fate and transport of water in a salt-based repository. In *International High-Level Radioactive Waste Management Conference*, Albuquerque, NM, 2013. American Nuclear Society.

[16] Dylan R Harp, JW Carey, and R Pawar. Capturing coupled effects of co2 and brine leakage in cemented wellbores at co2 storage sites using decoupled reduced order models. *AGU Fall Meeting Abstracts*, 1:1271, 2013.

[17] A Jordan, Dylan R Harp, PH Stauffer, JA Ten Cate, Y Labyed, H Boukhalfa, Z Lu, MA Person, and BA Robinson. Fluid transport driven by heat-generating nuclear waste in bedded salt. *AGU Fall Meeting Abstracts*, 1:1102, 2013.

[18] Velimir V Vesselinov, Danny Katzman, David Broxton, Kay Birdsell, Steven Reneau, David Vaniman, Pat Longmire, June Fabryka-Martin, Jeff Heikoop, Mei Ding, et al. Data and model-driven decision support for environmental management of a chromium plume at los alamos national laboratory–13264. *Waste Management 2013*, 2013.

[19] VV Vesselinov, Dylan R Harp, PK Mishra, and D Katzman. Model-driven decision support for monitoring network design: methods and applications. *AGU Fall Meeting Abstracts*, 1:03, 2012.

[20] Charles Castello, Mark Williamson, Kurt Gerdes, Dylan R Harp, and Velimir Vesselinov. Near-optimal placement of monitoring wells for the detection of potential contaminant arrival in a regional aquifer at los alamos national laboratory. In *System Theory (SSST), 2012 44th Southeastern Symposium on*, pages 61–66. IEEE, 2012.

[21] VV Vesselinov and Dylan R Harp. Model analysis and decision support (mads) for complex physics models. In *XIX International Conference on Water Resources, CMWR 2012*, Urbana-Champaign, IL, 2012. University of Illinois.

[22] Dylan R Harp, KH Birdsell, and VV Vesselinov. An agent-based approach to global uncertainty and sensitivity analysis (abagus). In *LANL Postdoc Research Day*, Los Alamos, 2011. Los Alamos National Laboratory.

[23] Dylan R Harp and VV Vesselinov. Model-based decision analysis of remedial alternatives using info-gap theory and agent-based analysis of global uncertainty and sensitivity (abagus). In *AGU Fall Meeting Abstracts*, San Francisco, 2011.

[24] VV Vesselinov and Dylan R Harp. Decision analyses for optimization of monitoring networks based on uncertainty quantification of model predictions of contaminant transport. In *AGU Fall Meeting Abstracts*, San Francisco, 2011.

[25] PK Mishra, Dylan R Harp, TA Miller, and VV Vesselinov. Data intensive simulation and analysis of groundwater flow and transport in the los alamos aquifer. In *AGU Fall Meeting Abstracts*, San Francisco, 2011.

[26] VV Vesselinov and Dylan R Harp. Decision analyses for optimization of monitoring networks based on uncertainty quantification of model predictions of contaminant transport. *AGU Fall Meeting Abstracts*, 1:1201, 2011.

[27] Dylan R Harp and VV Vesselinov. Analysis of hydrogeological structure uncertainty by estimation of hydrogeological acceptance probability of geostatistical models. In *AGU Fall Meeting Abstracts*, San Francisco, 2010.

[28] VV Vesselinov and Dylan R Harp. Optimization of monitoring networks based on uncertainty quantification of model predictions of contaminant transport. In *AGU Fall Meeting Abstracts*, San Francisco, 2010.

[29] Dylan R Harp, KH Birdsell, and VV Vesselinov. Examining hydrologic plausibility of geostatistical models. In *LANL Postdoc Research Day*, Los Alamos, NM, 2010. Los Alamos National Laboratory.

[30] VV Vesselinov and Dylan R Harp. Decision support based on uncertainty quantification of model predictions of contaminant transport. In J. Carrera, editor, *XVIII International Conference on Water Resources, CMWR 2010*, Barcelona, 2010. CIMNE.

[31] Dylan R Harp and VV Vesselinov. Identification of hydrostratigraphy: Optimization of markov-chain geostatistical model by adjusting facies conductivities, mean facies lengths, and mean transition lengths. In *AGU Fall Meeting Abstracts*, San Francisco, 2009.

[32] Dylan R Harp, Vesselinov V Vesselinov, and Kay H Birdsell. Hydrogeological property inference using spatially-dependent aquifer parameters. In *AGU Fall Meeting Abstracts*, San Francisco, 2009.

[33] KH Birdsell, Dylan R Harp, and VV Vesselinov. Hydrogeologic property inference using spatially-dependent aquifer parameters. *AGU Fall Meeting Abstracts*, 1:0805, 2009.

[34] Dylan R Harp and VV Vesselinov. Estimation of hydrostratigraphy by optimization of markov-chain geostatistical model using mean facies and transition lengths as adjustable parameters. *AGU Fall Meeting Abstracts*, 1:04, 2009.

[35] VV Vesselinov, Dylan R Harp, RJ Koch, and KH Birdsell. Tomographic inverse estimation of aquifer properties based on pressure variations caused by transient water-supply pumping. *AGU Fall Meeting Abstracts*, 1:02, 2008.

[36] Dylan R Harp, Z Dai, AV Wolfberg, JA Vrugt, BA Robinson, and VV Vesselinov. Aquifer structure identification and uncertainty evaluation using evolutionary stochastic inversion. In *Computational Methods in Water Resources, XVII International Conference*, San Francisco, 2008.

[37] Z Dai, Dylan R Harp, and A Wolfsberg. Sensitivity analysis of transition probability models to aquifer structure parameters for identifying aquifer heterogeneity. In *AGU Fall Meeting Abstracts*, volume 1, page 06, 2008.

[38] Dylan R Harp, M Reda Taha, J Stormont, E Farfan, and J Coonrod. Application of fuzzy modeling to estimate soil-water evaporation. In *Unsaturated Soils 2006, ASCE Conference*, Phoenix, 2006.

[39] Dylan R Harp, J Stormont, M Reda Taha, E Farfan, and J Coonrod. Estimation of bare-soil evaporation using fuzzy modeling. In *GeoCongress 2006, ASCE Conference*, Atlanta, 2006.

[40] E Farfan, J Stormont, Dylan R Harp, and J Coonrod. Estimating evaporative fluxes in dry climates. In *Unsaturated Soils 2006, ASCE Conference*, Phoenix, 2006.

[41] E Farfan, J Stormont, J Coonrod, and Dylan R Harp. Riparian restoration effects on the middle rio grande water budget. In *GeoCongress 2006, ASCE Conference*, Atlanta, 2006.

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